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March 3, 1993

Mr. Bruce E. Blowey
Assistant Engineer - Operations & Maintenance
LADWP
111 North Hope Street, Room 1255-C
Los Angeles, CA 90012-2694

Dear Mr. Blowey:

Interim Report on the Condition of Burners for IGS Units 1 and 2

Per request by Mr. Byron Fujikawa in our Inside Area Work Group Meeting, we are writing to inform you, that to the best of our knowledge, **the burners on Unit 1 and 2 are in good operating condition.**

Based on information available to date, mechanical integrity of the flame stabilizers and burners have been good. Unit 1, which has both new burners and flame stabilizers, has not yet been physically inspected. Unit 1, which is approaching one year of operation, has a major outage scheduled on April 12, 1993. Based on its performance to date, we expect no overheating or signs of pluggage. However, we plan to conduct a fireside inspection to confirm their condition. The only method of physical inspection for the flame stabilizers is by using a pick from the furnace. A fireside inspection requires an extended outage for assembly and removal of the inspection platform.

A problem has been detected on the burner tip of B2 during an operational inspection. It appears that the nozzle tip has overheated. The diffuser is intact, but obstructs the view for adequate inspection. It is believed the nozzle may have been overheated by either the loss of the air restriction shroud on the outer air register or the backplate closing off causing air loss to the inner air register. The burner has been isolated from operation.

Unit 2's flame stabilizers have been inspected, after one year of operation, and look in excellent condition. There was no evidence of overheating, mechanical degradation and only minor slag buildup on the flame stabilizers. This, of course, was our primary concern prior to installation, which would have forced the unit back off line for repairs. Additionally, the accelerated mechanical degradation experienced in the past on the burners appears to have been greatly decreased. Please reference the attached outage inspection sheet, which found one minor problem on F3 flame stabilizer.

The main problem experienced on Unit 2, this last outage, is with the nozzle tips. Six nozzles tips were split at the seam weld. These nozzles had been replaced just the previous major outage. The problem has been traced back to inadequate material provided and the weld technique used.

Based upon the combustion constituents, the burners have operated about the same as before the modifications. These constituents include: NOx, LOIs, CO, oxygen levels plus eyebrow formation. Our objective, in making the burner modifications, was not to worsen any of these operating parameters. These parameters were satisfactory prior to the modifications.

We believe, however, we have made modest improvements although subjective in evaluation. We are looking at long term trends to better evaluate these constituents and to help negate outside factors which influence their production. A primary concern has been NOx and unburned carbon in ash (LOI) levels. Both NOx and LOIs, before and after the modifications have not significantly changed.

A concern was brought up by Mr. Irwin Stein on NOx level fluctuations in October and December of 1992 on Unit 1. Attached is a plot showing daily average emission NOx levels for both units during the second, third and fourth quarters of 1992 (period since new CEM data acquisition system available). The trend we see is general tracking of Units 1 and 2. This common denominator, although subtle, would indicate a common influence on NOx production such as coal quality.

It needs to be pointed out, once again, the <u>reason for the burner replacement and flame stabilizer installation was to address the accelerated mechanical degradation of the burners</u>. The primary concern on Unit 1 was the potential hazard and safety condition this presented.

Flame stabilizers were installed on Unit 2 in October of 1991 to test their overall effectiveness. New burners, with an enhanced design which made allowances for thermal expansion, along with the flame stabilizers were installed on Unit 1 in April of 1992. Since their installation, the units been operating successfully.

Please note that the overall operation of the burners and boiler are <u>the same as</u> before the outage. This operation refers to the burner front temperature alarms, secondary air windbox damper positions and cooling air flow requirements to the burners. The approach, of leaving the operational setup on the burners the same, was to allow a direct comparison of the burner mechanical condition before and after the burner modifications.

The emphasis of these changes was to reduce the overheating occurring on the burners. We felt a majority of the damage was occurring while the burners were out of service. Part of this problem was how the burner registers were originally setup. The final approach taken to address all issues was to implement the changes all at one time.

These changes included the following:

a. burner design modifications, which made allowances for thermal expansion, upgraded material selection and addressed throat sleeve air leakage,
b. flame stabilizer installation to address flame dynamics concerns,
c. inner and outer air flow balancing to eliminate the differences observed between in service and out of service burner level flow conditions,
d. new burner register setup arrangement which allowed tuning for flame characteristics,
e. fuel balancing to address oxygen and carbon monoxide imbalances observed at the economizer outlet.

One of the problems we have in evaluating the success of the burner modifications is in determining which of the five factors listed will have the greatest impact in reducing mechanical damage. Certainly, all five in combination seems, at this point, to have improved the burner condition.

Future enhancements, to further guarantee the life of the burners, are possible. We feel we can increase cooling air flow requirements to out of service burners and not dramatically impact boiler performance. With the new burner design, substantial improvements were made in reducing the leakage from around the burners with the modified throat sleeve assembly. This leakage reduction would help offset increases made to cooling air flow requirements.

<u>One problem that still exists is burner line fires</u> located at the entrance of the burner nozzle (diffuser area). We feel, however, this a separate issue, unrelated to the flame conditions and setup of the burner. We have installed additional temperature switches on the entrance elbow for early alarming of potential problems. An investigation into the causes of this phenomenon is still continuing.

A burner report will be issued after we get an opportunity to inspect the condition of the burners and flame stabilizers on Unit 1. It would be difficult to release a more in depth report on the condition of the burners without this information.

I would like to extend a personal invitation to Mr. Byron Fujikawa and Mr. Irwin Stein to come out during the Spring 1993 Outage on Unit 1 for a first hand account of the burner and flame stabilizer condition. This would be an ideal opportunity to review the modifications made to date, their success or shortcomings and recommendations for additional changes.

If you have any questions concerning this matter, please contact Jerry Hintze at (801)864-4414.

Sincerely,

S. Gale Chapman
President & Chief Operations Officer

AEN:
Attachments
cc:

INTERMOUNTAIN POWER SERVICE CORPORATION

Engineering Test and Inspection Sheet

Sheet ___ of ___

Equipment: Burner and Windbox | Unit #: 2 | Test/Inspection Date: November 2, 1992

Inspector: Garry Christensen and Cecil James | Responsible Engineer (Initials): ________

All burners were inspected from the windbox side and on the fire side from the platform. The following defects and deficiencies were noted:

Item or Test	Observations/Comments	Recommendations
B6	Small holes in the inner air sleeve just behind the back outer register plate at the 3:00 position.	Check next outage window for additional hole growth and inner air sleeve stability.
F2	The west half of the outer register has bowed back. See photo 1.	
F3	Nozzle has dropped far enough to contact the spin vanes but no the stabilizer.	Check next outage window if nozzle continues to drop and impinge on the stabilizer.
F4	The outer register has a sharp, short bow at the vane adjuster arm. See photo 2.	
A5	The nozzle has a 12 inch split at the weld seam. The nozzle has slipped behind the stabilizer's inner ring and is twisting the stabilizer as it heats and grows. See photo 3.	Nozzle replaced.
E4	The nozzle is starting to split at the weld seam.	
C6	The backplate push rod has cracked at the joint with the backplate resulting in the backplate sucking up into the inner air sleeve restricting inner air flow. See photo 4. The crack is circumferential and along the bottom half of the rod.	Rod repaired and reinforced. Install backplate hardstops on all burners so backplates will fail to a two inch air flow path.
H2	Backplate push rod failure similar to C6. The nozzle has deformed and split at the weld seam.	Rod repaired and reinforced.
H4	The nozzle tip has deformed.	
H6	The nozzle tip is starting to split at the weld seam.	
D1	Backplate push rod failure similar to C6.	Rod repaired and reinforced.

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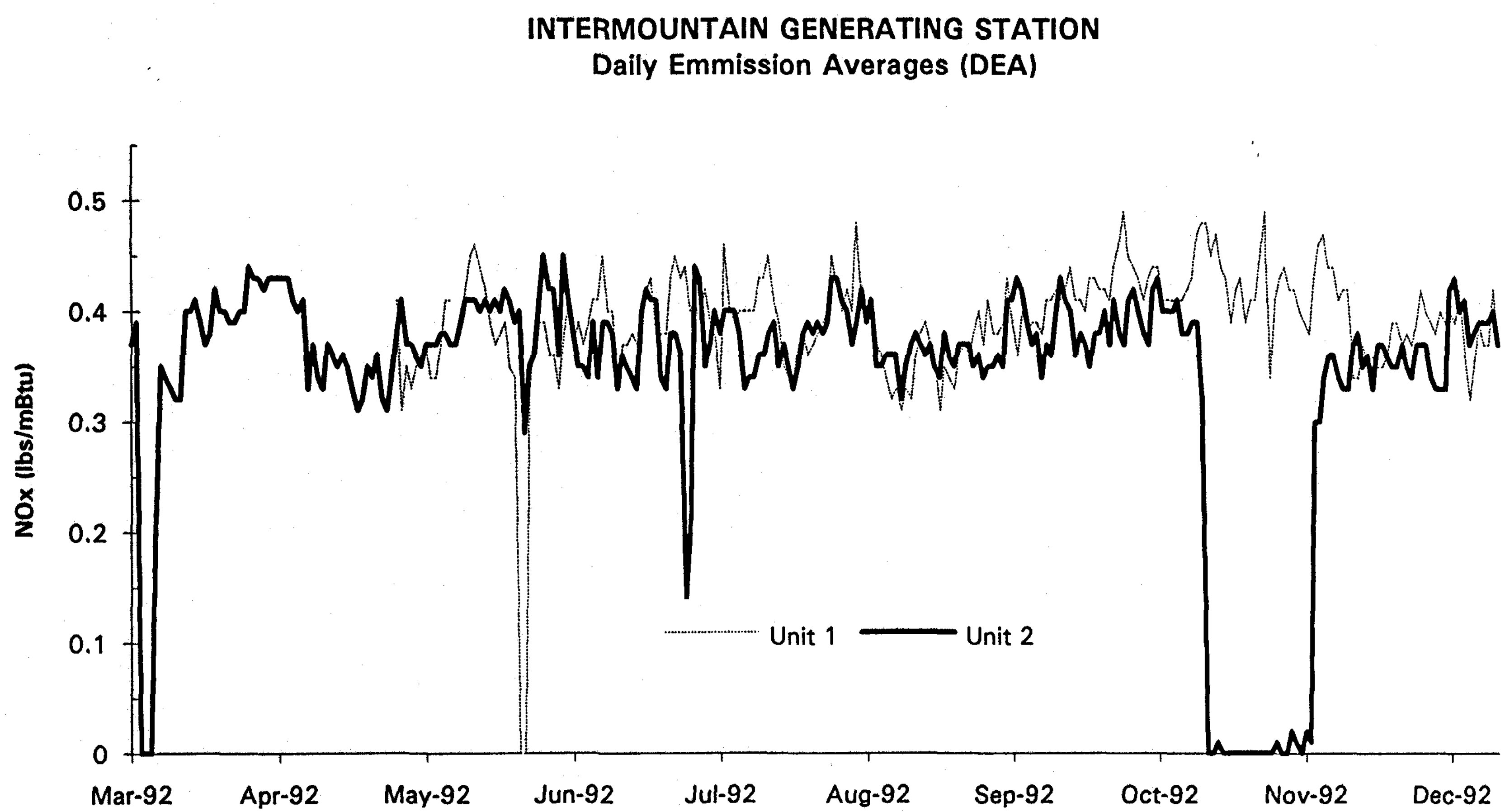
INTERMOUNTAIN GENERATING STATION
Daily Emmission Averages (DEA)
NOx (lbs/mBtu)
0.5
0.4
0.3
0.2
0.1
0
Mar-92
Apr-92
May-92
Jun-92
Jul-92
Aug-92
Sep-92
Oct-92
Nov-92
Dec-92
Unit 1
Unit 2

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